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NK-80

[NMEA2000 Adaptor]

User's Manual

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WARNING!
The equipment said in this manual must only be used to which it was designed. Improper operation or installation may cause damage to the equipment. AMEC will not incur any liability as a result of equipment damage or data loss due to improper usage or installation of the equipment. It is strongly recommended reading this manual and the following safety instructions before proceeding to the installation or operation.

WARNING	WARNING
ELECTRICAL SHOCK HAZARD. Do not disassemble the equipment. Only qualified personnel should service the product.	**PLEASE KEEP AWAY FROM DIRECT WATER CONTACT.** Even though the equipment is waterproof, it is recommended to keep water away from reach. Water leaking into the equipment may cause electrical shock or fire.
TURN OFF THE POWER IMMEDIATELY IF WATER LEAKS IN OR OBJECT DROPS ONTO THE EQUIPMENT. Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor for service.	**AVOID OPERATING THE EQUIPMENT WITH WET HANDS.** Despite the fact that it is safe, but like any other electric appliances, operate with dry hands.

FOREWORD

Congratulations on the purchase of NK-80 NMEA 2000 adaptor. NK-80 NMEA 2000 adaptor is clever designed to enable communication between NMEA 2000 and NMEA 0183. Unless improper used, installed**,** or maintained, the equipment should perform at its optimum.

The operation instructions contained in this manual is applied only to NK-80. AMEC and the authorized local agent/dealer will not bear any responsibilities of damages resulted from improper installations made by unauthorized agent/dealer.

We thank you for choosing our product

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1. NK-80 Introduction

1.1. What is NMEA 2000?

The NMEA 2000 transmits data through Controller Area Network (Can Bus). It simplifies the connections and enables information sharing among different devices through a single trunk cable. Compared with NMEA 0183 in “RS422” interface, NMEA 2000 has better transmission reliability and shares data easier in a network.

1.2. NK-80 Overview

NK-80 NMEA 2000 adaptor (as known as NK-80) is a gateway between NMEA 0183 electronic devices and NMEA 2000 device/network. NK-80 allows users to connect their existing NMEA 1083 devices to the NMEA 2000 network.

The key features of NK-80 are shown as follows:

High-Performance 32-bit RISC CPU has a performance of 80 DMIPS to manage high traffic loading of NMEA data transactions.

Build-in memory storage with 64KB RAM and 256KB Flash ROM, it is more effective to control the dataflow.

Configurable through a serial connection allows users to monitor/control NMEA data transactions.

NMEA 2000 Certified ensures product quality is reliable in most extreme conditions.

Isolated power is provided through NMEA 2000 network, NK80 requires no additional battery source.

2. Installation

2.1. Items in the Package

The NK-80 standard package is listed in Table 2.1. It is also illustrated in Figure 2.1.

Table 2.1 Standard Equipment List

No.	Description	Qty
1	AMEC NK-80 NMEA 2000 adaptor	1
2	Manual	1
3	Screw M4	4
4	CD	1

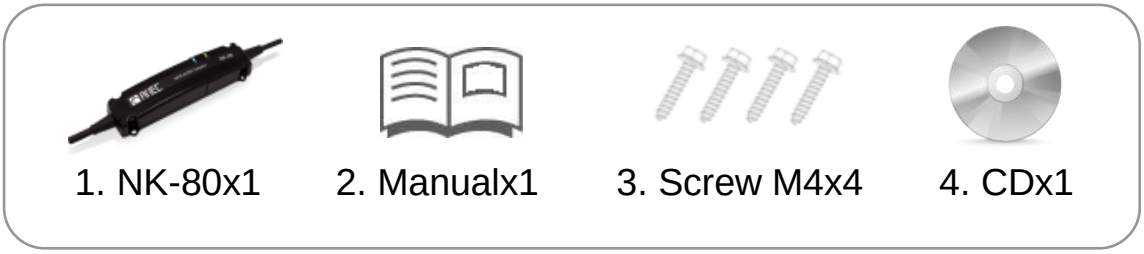
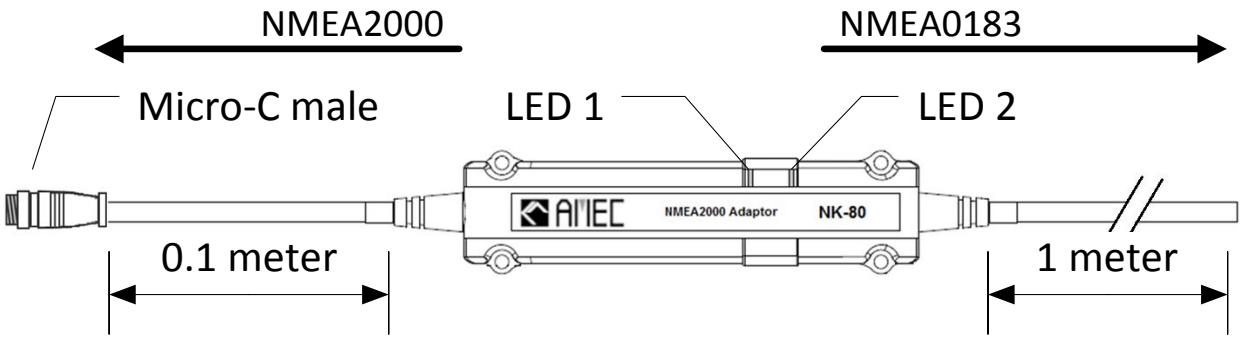


Figure 2.1 Standard Package

2.2. Connection

Diagram below shows the physical attributes of NK-80.



2.2.1. NMEA 2000 Connections

The Micro-C male connector is an NMEA 2000 standard connector. Connect this connector to any available Micro-C female connector in the NMEA2000 network.

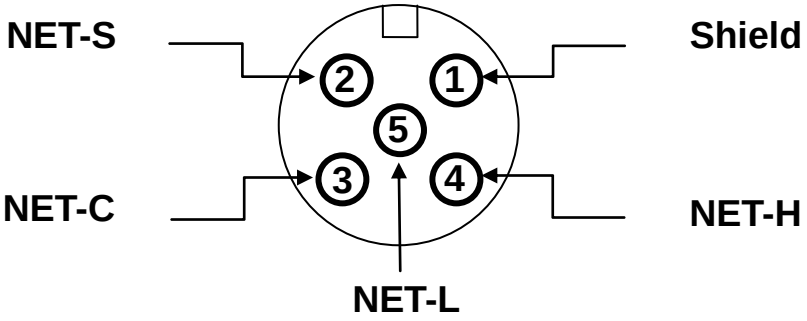


Figure 2.2.1 Pin Definitions of the Micro-C Male Connector

2.2.2.NMEA 0183 Connections

The NMEA 0183 cable provides flexible wiring to devices. Please follow the NMEA 0183 cable description below when wiring to an NMEA 0183 device.

Table 2.2.2. Wire Information for NMEA 0183 Cable

Pin	Wire color	Name	Function
1	RED	TXP	Positive(＋); NMEA 0183 Data output
2	GREEN	TXN	Negative (－); NMEA 0183 Data output
3	BLACK	RXP	Positive(＋); NMEA 0183 Data input
4	BLUE	RXN	Negative (－); NMEA 0183 Data input
5	SHIELD	GND	Ground

- **Wiring NMEA 0183 to NMEA 0183/RS-422 Device**

Please follow the wiring diagram below to connect an NMEA 0183/RS-422 device.

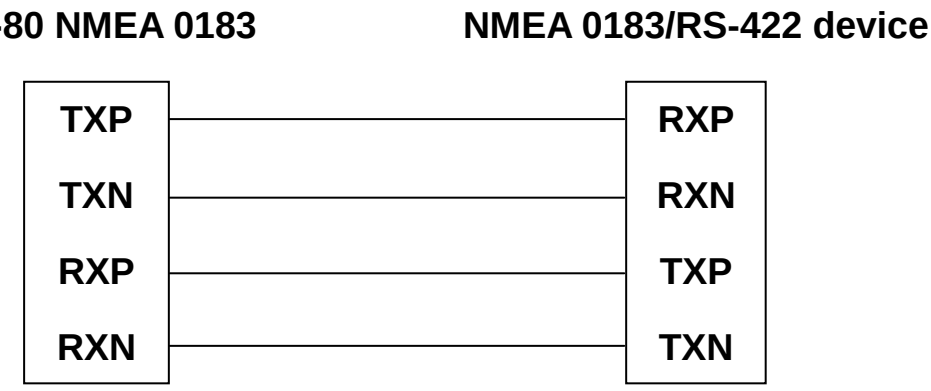


Figure 2.2.2.1-1 NMEA 0183 to RS-422 Connection

NOTE: Please ensure the connecting device is fully NMEA 0183 compliant.

- **Wiring NMEA 0183 to RS-232/PC**

  Please follow the wiring diagram below to connect to RS-232/PC

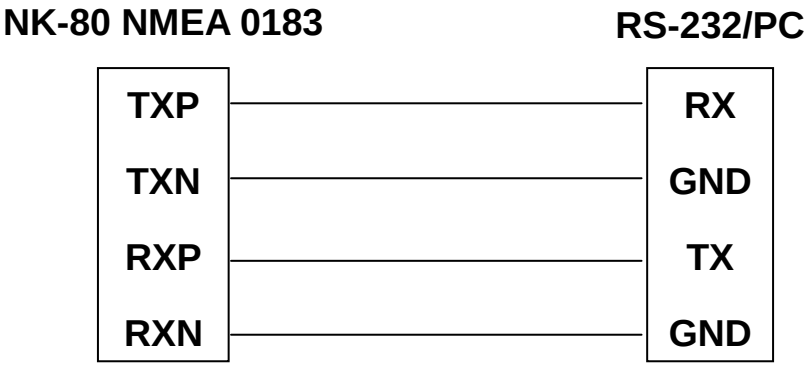


Figure 2.2.2.1-2 NMEA 0183 to RS-232 Connection

NOTE: Please ensure the wire definitions of RS-232/PC are correct during wiring.

3. Operation

3.1. Operation in NMEA 2000 Network

NK-80 NMEA 2000 adaptor converts messages from NMEA 2000 to NMEA 0183 and vice versa. NK-80 enables NMEA 0183 devices to communicate to a NMEA 2000 network.

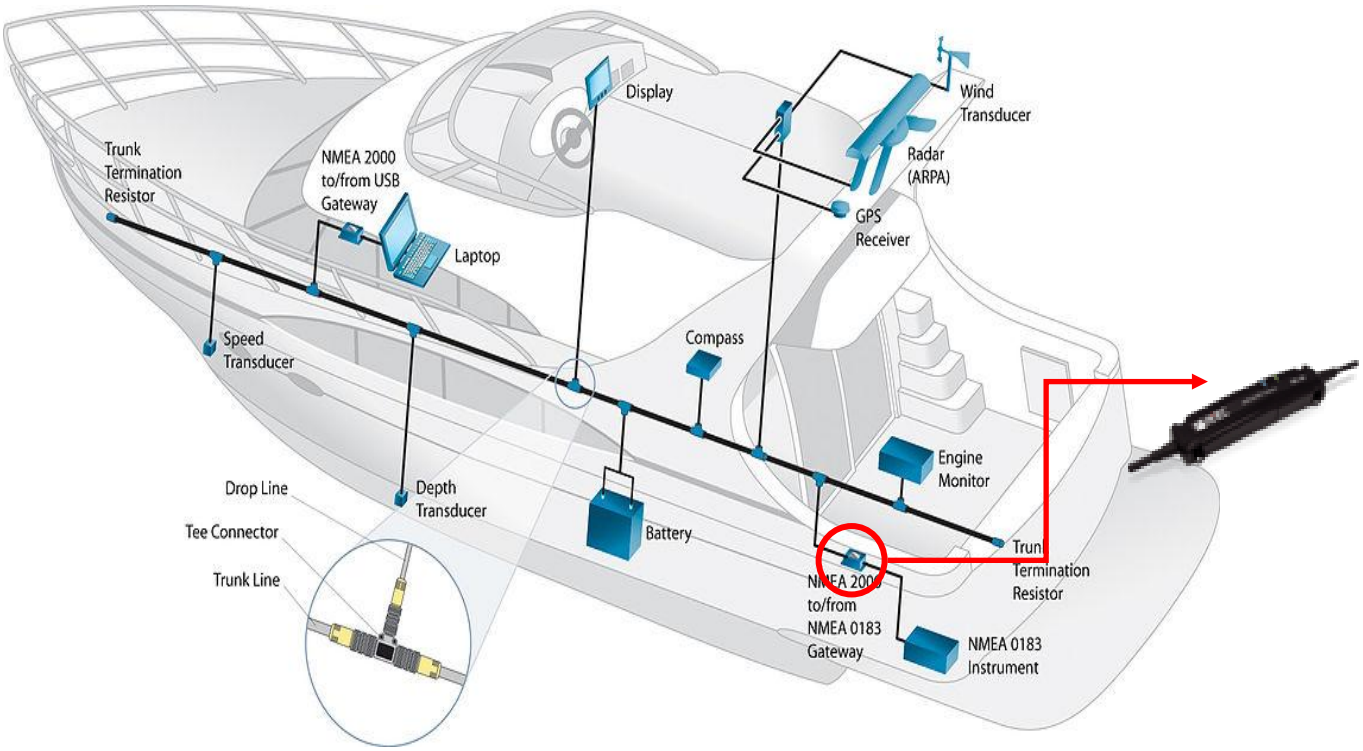


Figure 3.1 NK-80 in an NMEA 2000 Network (reference from NMEA association)

3.2. LED Indication

NK-80 has two LED indicators: LED 1 and LED 2.

- LED 1 flashes blue light when processing/receiving NMEA 2000 messages.
- LED 2 flashes green light when processing/receiving NMEA 0183 messages.

Figure 3.2 LED Indication of NK-80

The details on indicators statuses are shown in the following table.

Table 3.2 Description of Indicator Statuses

Indication	Status	Description
LED 1 ●(Blue)	Flash	Receiving NMEA 2000 messages
LED 2 ●(Green)	Flash	Receiving NMEA 0183 messages
LED 1 ●(Blue) LED 2 ●(Green)	Flash simultaneously in a 5 seconds interval	Normal Operation
LED 1 ●(Blue) LED 2 ●(Green)	Steady	During Firmware Upgrading
LED 1 ●(Blue) LED 2 ●(Green)	Flash takes more than 5 seconds	System/Power Failure*

***NOTE:** If it takes more than 5 seconds to see LED activities, please verify your NMEA 2000 network power output voltage.

3.3. Configuration Utility

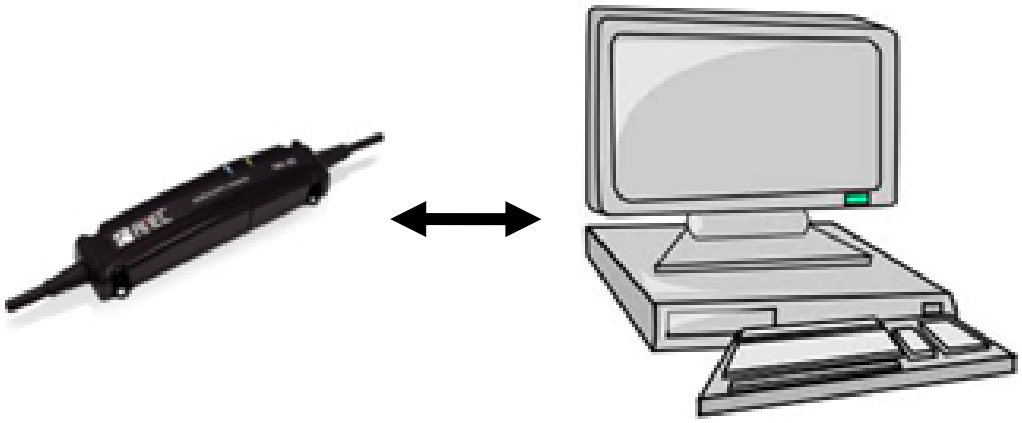
In a general usage, no configuration is required for the NK-80 NMEA 2000 adaptor to work.

For advanced operations*, NK-80 provides the following configuration settings.

- Change default NMEA 0183 baud rate (38,400 bps)
- Filter NMEA 0183 / NMEA 2000 output messages
- Save NMEA 0183 output message log

How to configure NK-80 NMEA 2000 adaptor?

Step 1: Connect NK-80 NMEA 2000 adaptor to PC through RS-232/USB and ensure power is available from the NMEA 2000 network.



***NOTE:** PC connection is required for advanced configuration.

Step 2: Run AMEC NMEA Configuration utility.

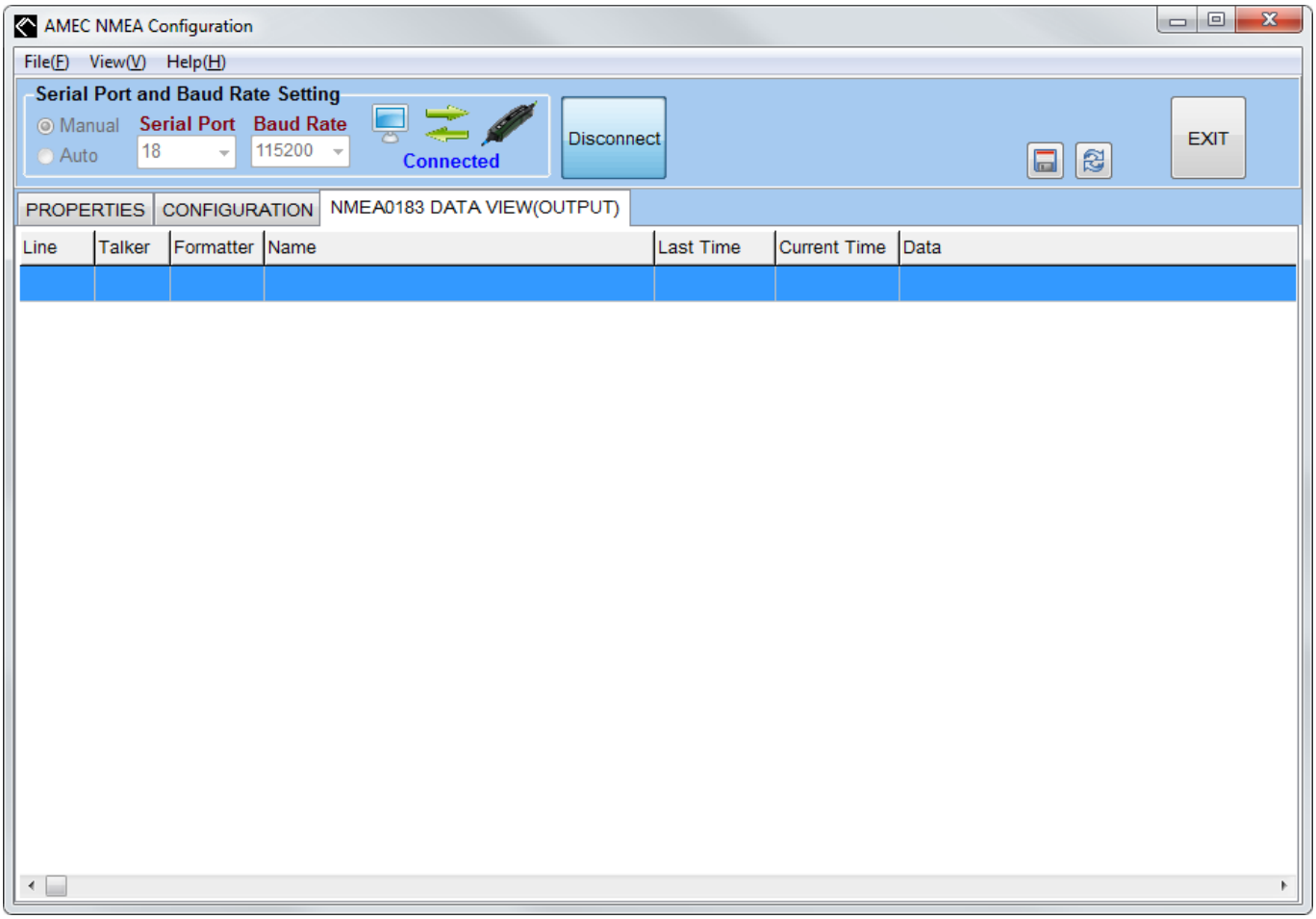


Figure 3.3-1 AMEC NMEA Configuration Utility

Step 3: Manually enter port value and NMEA 0183 baud rate. If unknown, choose **Auto**. Now, click **Connect** to connect NK-80.

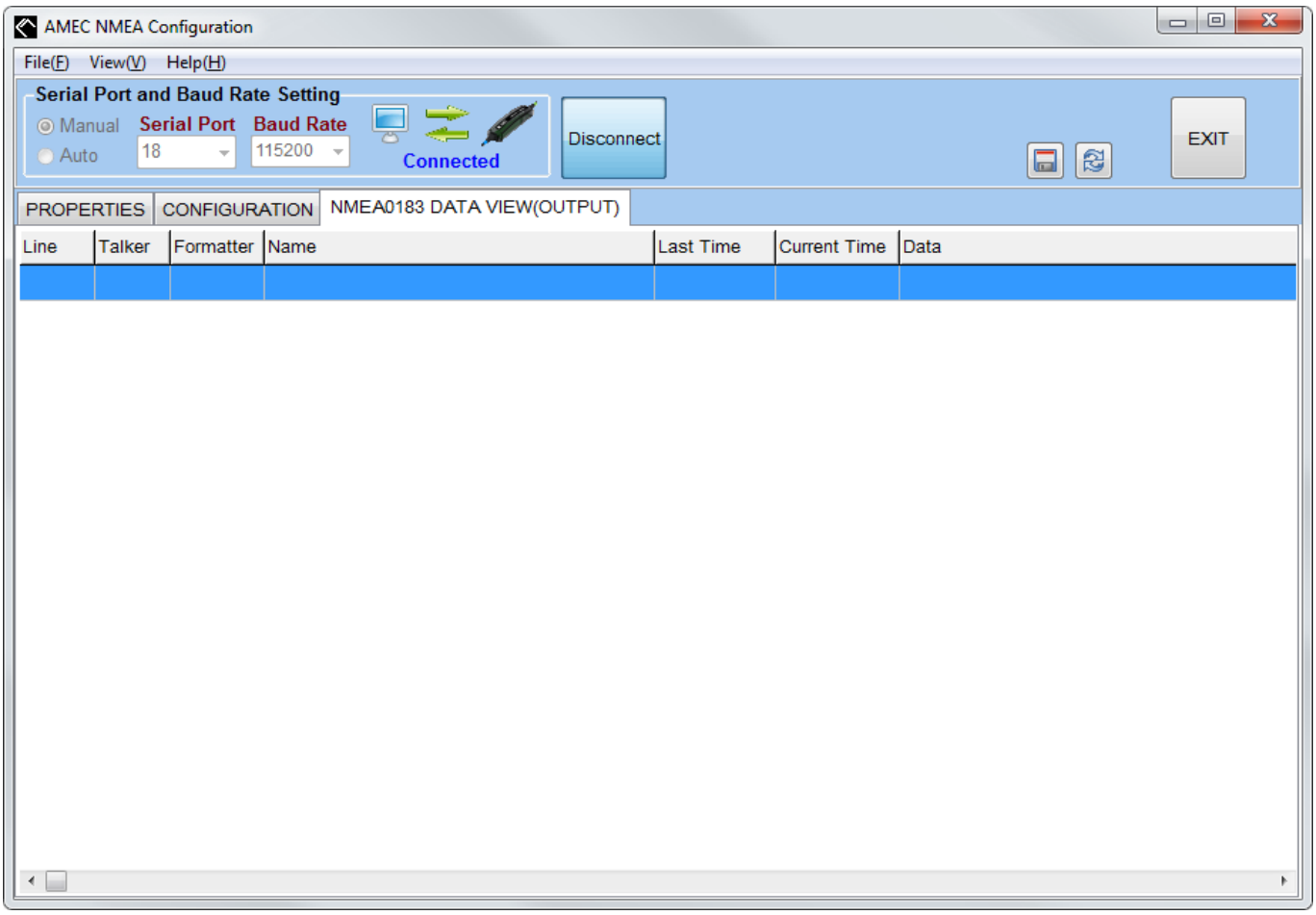


Figure 3.3-2 Configuration Utility Connected to PC

3.3.1.Change NMEA 0183 Default Baud Rate (38,400 bps)

At the **PROPERTIES** tab, click on the **Change NMEA Baud Rate** button. Choose the desired baud rate and click on the **Apply** button.

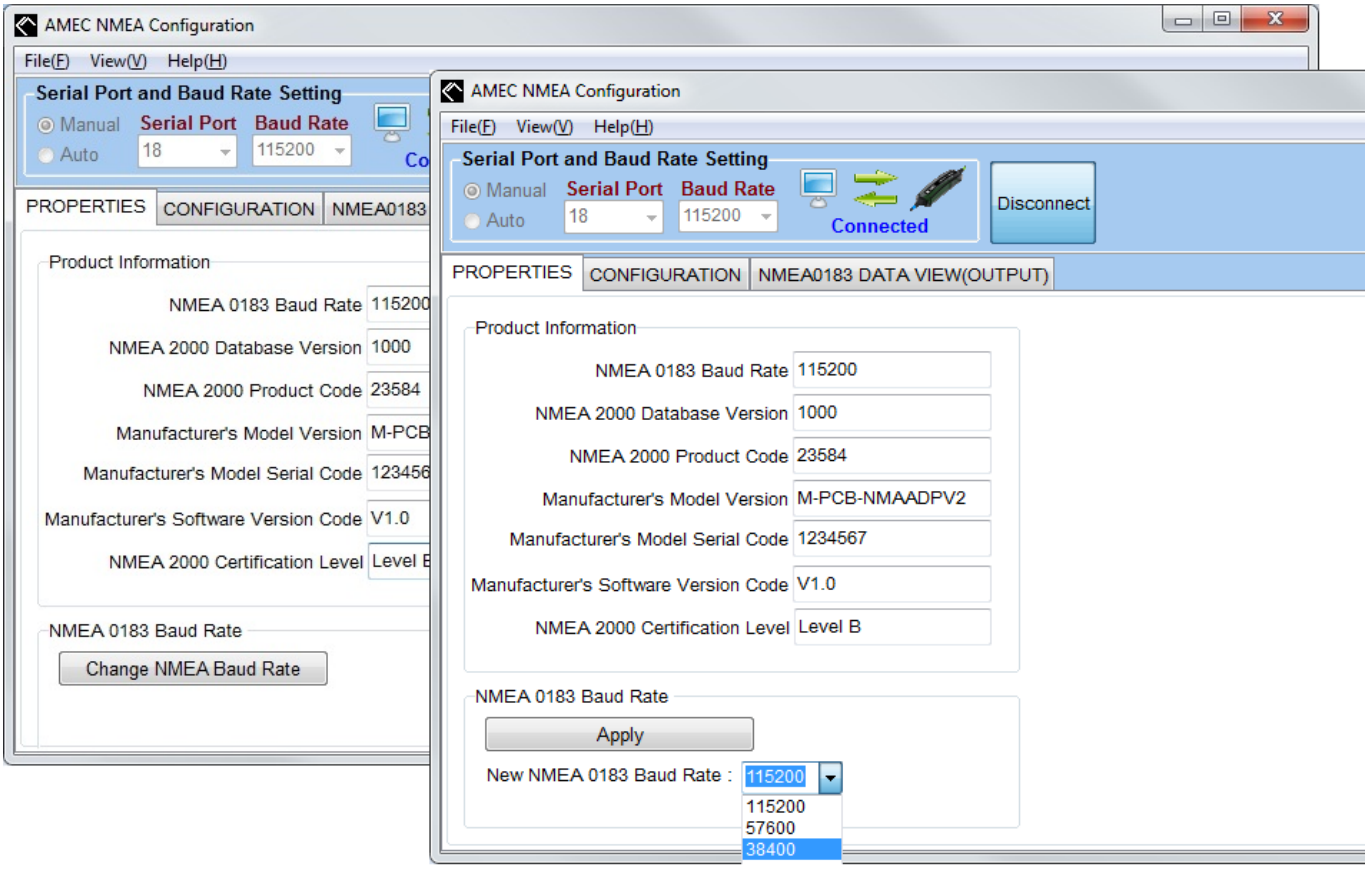


Figure 3.3.1 Properties Tab

3.3.2.Filter NMEA 0183 / NMEA 2000 Output Messages

Step 1: At the **CONFIGURATION** tab, expand the message list on the left and click on a desired message to configure.

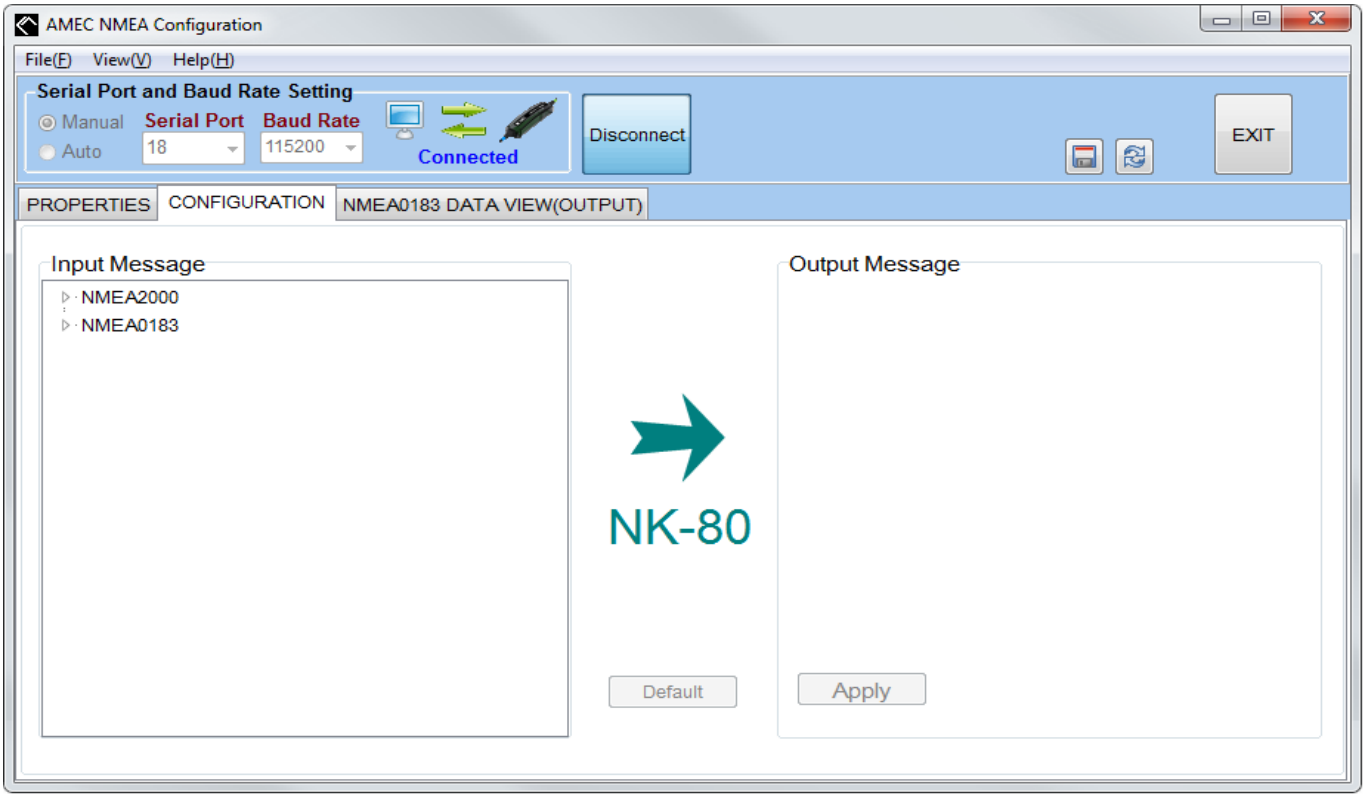


Figure 3.3.2-1 NMEA Message Filtering

HINT: Double click to expand the message groups will show their message names.

Step 2: Once clicked on the desired message, the message properties will reveal on the right panel. On the panel choose the needed attributes and click on **Apply**.

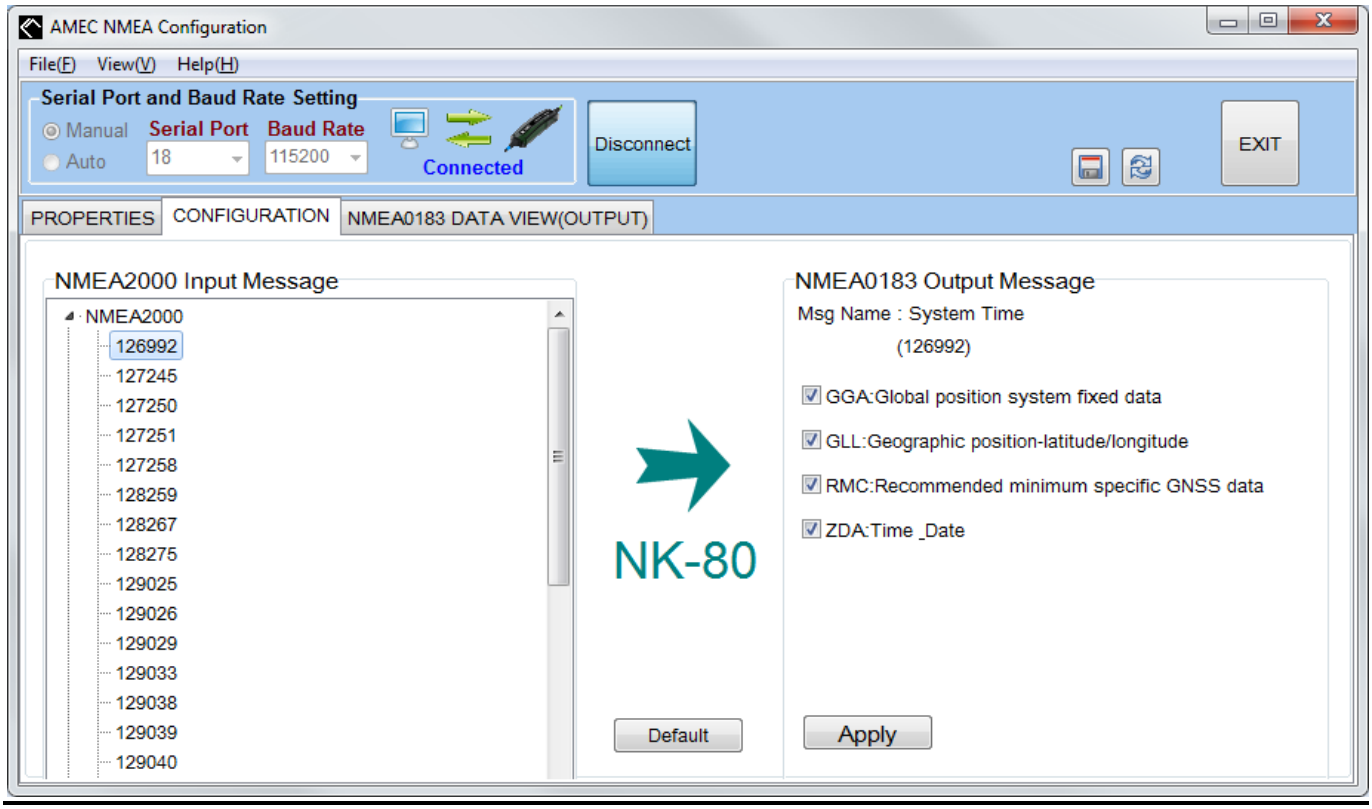


Figure 3.3.2-2 NMEA Message Filtering

Note: All message settings are enabled in factory default. The **Default** button restores all message settings back to factory default.

3.3.3.Save NMEA 0183 Output Message Log

Click on the **NMEA 0183 DATA VIEW (OUTPUT)** tab to view message log history.

To record a log session, click on the disk button to start recording. The system will prompt you first to save the log. It continues logging till the icon is click again.

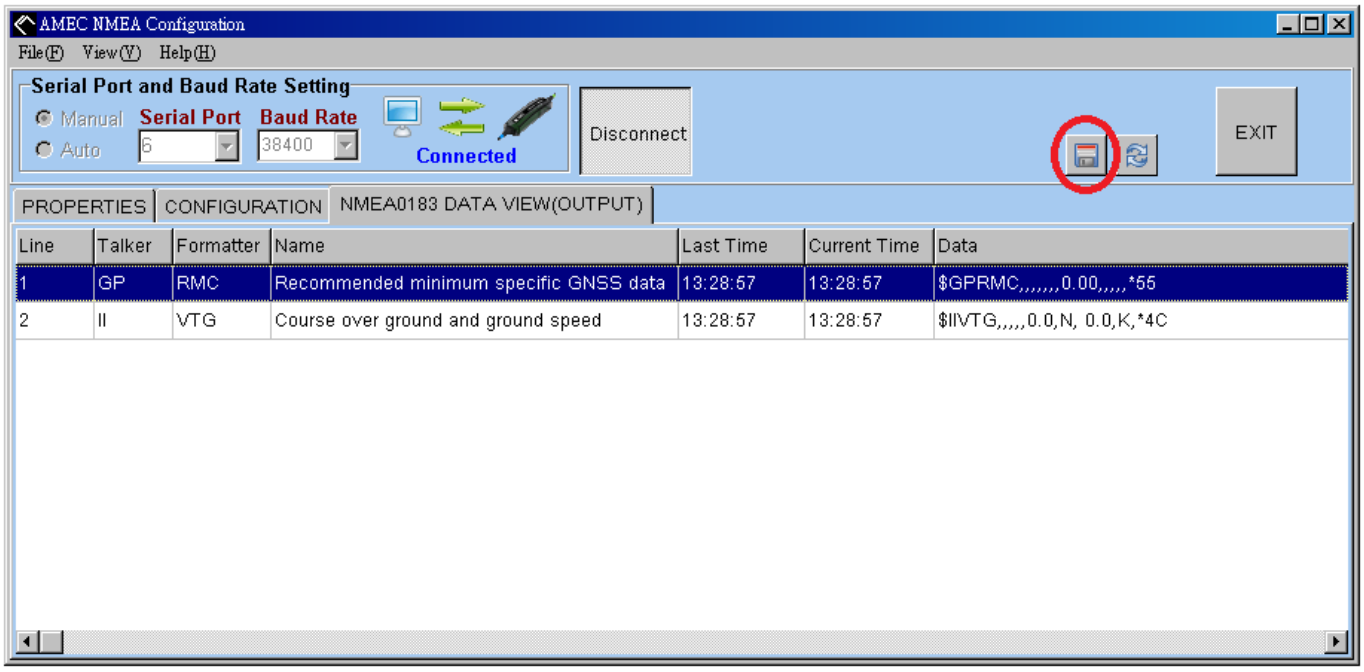


Figure 3.3.3-1 NMEA 0183 Data Log

NOTE: NK-80 configuration utility can only log NMEA 0183 output sentences processed from NMEA 2000 messages.

Shown below is the content of a log file.

```
Start Time (13:15:36)
Time        Message Type    Data
====        ============    ====
13:16:34    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:34    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:34    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:34    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:36    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:36    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:36    NMEA0183        $GPRMC,,,,,,,0.00,,,,,*55
13:16:36    NMEA0183        $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:36    NMEA0183        $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:36    NMEA0183        $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
End Time (13:16:45)
```

Figure 3.3.3-2 A Sample Log File

4. Appendix

4.1. Product Specifications

STANDARDS

NMEA 2000 standard version1.2 (2004)

NMEA 2000 CAN Bus line Transmitter

Parameter	Conditions	Min.	Max.
Recessive bus voltage	VTXD = VDD; no load.	2.0V.	3.0V.
Dominant bus voltage NET-H	VTXD = 0.8V	2.75V	4.5V
Dominant bus voltage NET-L	VTXD = 0.8V	0.5V	2.25V
Recessive differential output voltage	VTXD = 2V; no load	-500mV	50mV
Dominant differential output voltage	40Ω < RL < 60Ω	1.5V	3.0V

NMEA 2000 CAN Bus line Receiver

NET-H, NET-L common-mode input resistance	typical 100 KΩ
Differential input resistance	typical 100 KΩ

Input/Output

Configurable Baud rate	4,800, 9,600, 38,400 (default), 57,600, 115,200 bps

Environmental

Operation Temperature	-20°C~+55°C
Storage Temperature	-25°C~+70°C
Water Proofing	IP54
Humidity	0~80%RH

PHYSICAL

Length	132 mm
Width	30 mm
Height	22.8 mm
Cable Lengths	NMEA 2000 cable: 0.1m
	NMEA 0183 cable: 1 m
Weight	< 150 g

ELECTRICAL

NMEA 2000 Load Equivalency Number (LEN)	1 (under 50 mA)

POWER SUPPLY

Supply Voltage from CAN Bus	12VDC / 24VDC (Typical)

4.2. Dimension

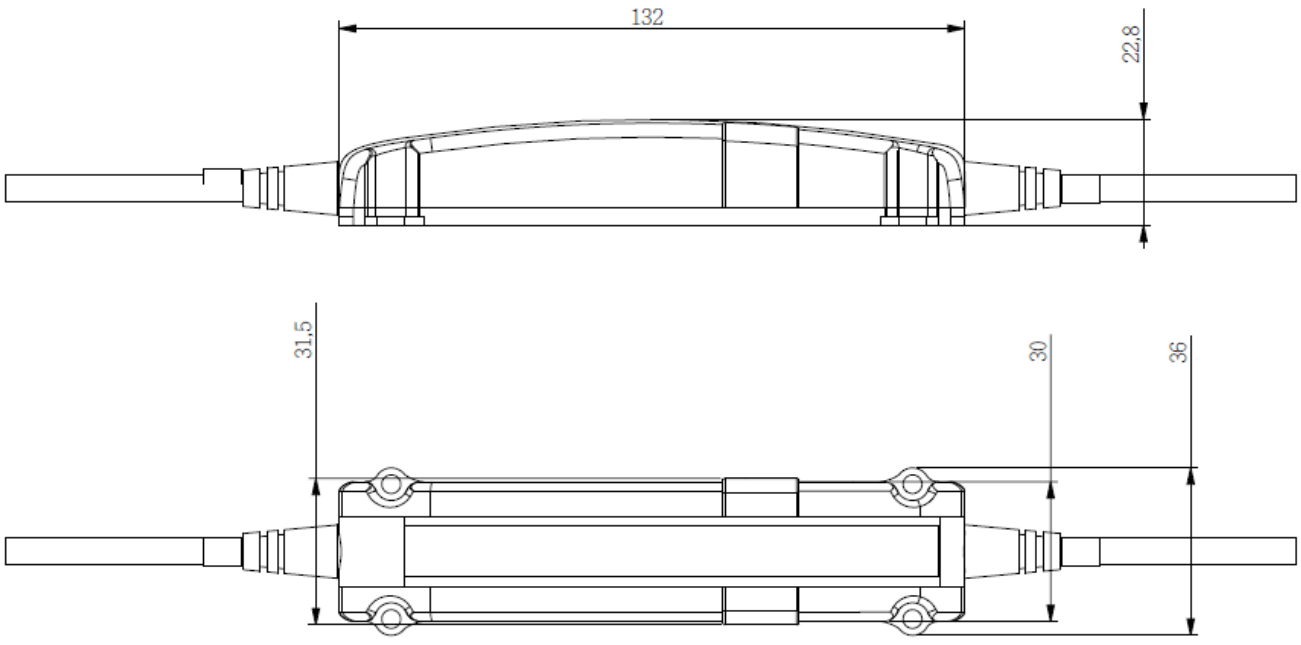


Figure 4.2 NK-80 Main Body Dimension (mm)

4.3. PGN Information

Table 4.3 PGN Information

Transmit		Receive	
PGN	**Description**	**PGN**	**Description**
59392	ISO Acknowledgment	**59392**	Acknowledgment
59904	Request	**59904**	Request
60928	Address_Claim	**60928**	Address_Claim
126464	PGN List - Transmit PGN's group function	**126992**	System_Time
126992	System_Time	**127245**	Rudder
126996	Product_Information	**127250**	Vessel_Heading
127245	Rudder	**127251**	Rate_of_Turn
127250	Vessel_Heading	**127258**	Magnetic_Variation
127251	Rate_of_Turn	**128259**	Speed_Water_referenced
127258	Magnetic_Variation	**128267**	Water_Depth
128259	Speed_Water_referenced	**129025**	Position_Rapid_Update
128267	Water_Depth	**129026**	COG_SOG_Rapid_Update
129025	Position_Rapid_Update	**129029**	GNSS_Position_Data
129026	COG_SOG_Rapid_Update	**129033**	Time_Date
129029	GNSS_Position_Data	**129038**	AIS_Class_A_Position_Report
129033	Time_Date	**129039**	AIS_Class_B_Position_Report
129038	AIS_Class_A_Position_Report	**129040**	AIS_Class_B_Extended_ Position_Report
129039	AIS_Class_B_Position_Report	**129283**	Cross_Track_Error
129040	AIS_Class_B_Extended_ Position_Report	**129284**	Navigation
129283	Cross_Track_Error	**129539**	GNSS_DOPs
129284	Navigation	**129540**	GNSS_Sats_in_View
129539	GNSS_DOPs	**129792**	AIS_DGNSS_Broadcast_ Binary_Message
129540	GNSS_Sats_in_View	**129793**	AIS_UTC_and_Date_Report
129792	AIS_DGNSS_Broadcast_ Binary_Message	**129794**	AIS_Class_A_Static_and_ Voyage_Related_Data
129793	AIS_UTC_and_Date_Report	**129795**	AIS_Addressed_Binary_Message

129794	AIS_Class_A_Static_and_ Voyage_Related_Data	**129796**	AIS_Acknowledge
129795	AIS_Addressed_Binary_Message	**129797**	AIS_Binary_Broadcast_Message
129796	AIS_Acknowledge	**129800**	AIS_UTC_Date_Inquiry
129797	AIS_Binary_Broadcast_Message	**129801**	AIS_Addressed_Safety_ Related_Message
129800	AIS_UTC_Date_Inquiry	**129802**	AIS_Safety_Related_ Broadcast_Message
129801	AIS_Addressed_Safety_ Related_Message	**129803**	AIS_Interrogation
129802	AIS_Safety_Related_ Broadcast_Message	**129804**	AIS_Assignment_Mode_Command
129803	AIS_Interrogation	**129805**	AIS_Data_Link_ Management_Message
129804	AIS_Assignment_Mode_Command	**129808**	DSC_Call_Information
129805	AIS_Data_Link_ Management_Message	**130306**	Wind_Data
129808	DSC_Call_Information	**130311**	Environmental_Parameters
130306	Wind_Data	**130312**	Temperature
130311	Environmental_Parameters		
130312	Temperature		